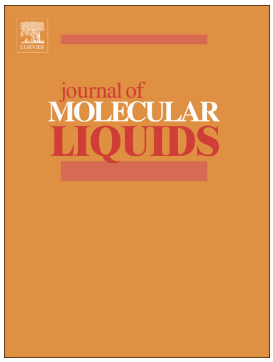
Accepted Manuscript



Volumetric, viscosity and ultrasonic studies of solute-solute and solute-solvent interactions of glycine and diglycine in water and in aqueous citric acid at different temperatures

Shashi Kant Lomesh, Dinesh Kumar

PII: S0167-7322(17)30498-1
DOI: doi: 10.1016/j.molliq.2017.05.004
Reference: MOLLIQ 7296

To appear in: *Journal of Molecular Liquids*

Received date: 4 February 2017
Revised date: ###REVISEDDATE###
Accepted date: 3 May 2017

Please cite this article as: Shashi Kant Lomesh, Dinesh Kumar , Volumetric, viscosity and ultrasonic studies of solute-solute and solute-solvent interactions of glycine and diglycine in water and in aqueous citric acid at different temperatures, *Journal of Molecular Liquids* (2017), doi: 10.1016/j.molliq.2017.05.004

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Volumetric, viscosity and ultrasonic studies of solute-solute and solute-solvent interactions of glycine and diglycine in water and in aqueous citric acid at different temperatures

Shashi Kant Lomesh, Dinesh Kumar

Department of Chemistry, Himachal Pradesh University, Shimla 171005, India.

Email id: drsklomesh@gmail.com, Tel : +919418382396

ABSTRACT

Densities, ρ, ultrasonic speeds, u and viscosities, η of glycine and diglycine in water and 0.1 mol.kg^{-1} aqueous citric acid solutions were measured over the temperature range (298.15 to 313.15) K at the interval of 5 K at atmospheric pressure. From these experimental data apparent molar volume Φ_V, limiting apparent molar volume Φ_V^O and the slope S_V, partial molar expansibilities Φ_E^O, adiabatic compressibility β, transfer volume $\Phi_{V\,tr}^O$, Falkenhagen coefficient *A*, Jone- Dole coefficient *B*, the temperature derivative of *B* coefficient *dB/dT* , intermolecular free length (L_f), specific acoustic impedance (Z), and molar compressibility (W) were calculated. The results are interpreted in terms of solute – solute and solute- solvent interactions . It was observed that glycine and diglycine act as structure breakers in aqueous citric acid at different temperatures.

Keywords: Apparent molar volume; partial molar volume expansibility; adiabatic compressibility; intermolecular free length; molecular interactions.

1. Introduction

Proteins are essential for the main physiological processes of life and perform functions in every system of the human body. Proteins are composed of amino acid subunits which form the polypeptide chains. Proteins form essential functions throughout the system of human body. These long chains of amino acids are critically important for catalyzing the chemical reactions, transporting materials across the cell and receiving and sending chemical signals. The proteins are surrounded not only with water but various kinds of inorganic and organic compounds. These compounds have great effects on the properties and structures of proteins which include their solubility, denaturation, dissociation into subunits and the activity of enzymes [1-2]. The complex configurational and conformational factors affecting the structure of proteins in the solution make the direct study of protein interactions difficult. Therefore one simple approach is to investigate the interactions of model compounds of proteins i.e. amino acids, peptides, amide and their derivatives in aqueous and mixed aqueous solutions [3-8].

To study the mechanism of the molecular interactions, amino acids, which are the basic building blocks of proteins and the most important model compound of proteins, are quite appropriate and useful to explore these molecular interactions. The thermodynamic and transport properties of amino acids in a variety of media can provide valuable information for the stability and denaturation of proteins which helps in promoting the progresses of human science and medicine [9-10]. Since living organism is a complex system, it is of immense importance to study the physiochemical properties of amino acids with functionally important bio-molecules in aqueous solutions [11-12]. Water which is the major component of any bio system is taken for the preparation of mixed solvent because its presence leads to

Download English Version:

https://daneshyari.com/en/article/5408383

Download Persian Version:

https://daneshyari.com/article/5408383

Daneshyari.com